

Claims: I hereby claim:

I A novel wet heat application apparatus for agricultural soil preparation and vegetation management, comprising;

a water absorbent mat with high water capillary capacity, charged and maintained with thermo energy by continuously saturating fabric with hot water (120-209F), and, by conductive heat exchange through pipe walls and into the wet mat by cycling water from

heater through the mat repeatedly.

a flexible, heat insulated and water impermeable liner that lines the top surface of the thermally charged water absorbent mat and blocks the heat from escaping up and outward. While in direct physical contact, the mat sops hot water onto the vegetation and into the soil, creating a thermo conduit from the heat charged mat to the heat targeted areas, improving hot water treatments for killing weeds, soil pathogens and nematodes.

2 The wet heat apparatus as claimed in claim 1, further comprising a low pressure (5-60psi) main water line entering the mat, branching as copper tubing that distributes the incoming hot water throughout said mat and saturates adjacent capillary material. The mat is thermally charged 120-209F and maintained at high temperatures by replenishment of hot water and by conduction of heat through the copper tubing of the mat as water cycles through the heater and back to the mat continuously. Water flow into the capillary material is adjustable by emitters along the conductive water tubing, as water consumption can be turned down and reduced while applied thermo energy is increased through heat exchange.

3. A wet heat apparatus as claimed in claim 2 further comprising a means of mobility and precision for hot water applications, via a multi wheeled unit that suspends said water absorbent mat in the undercarriage of said wheeled unit while traveling to field locations, and lowers said water mat onto plant bed and pulls said mat along the surface at the appropriate speed. An electric motor provides said wheeled mobile unit with wheel driven traction for traveling primarily to field locations, and a cable-pulled mobility system for control of said mobile unit's application location and application speed.

4. A wet heat apparatus as claimed in claim 3 further comprising a means of preheating

water with remote solar collectors and distributing preheated water to said mobile unit through a flexible hose that retracts onto a spool or extends from the spool, according to the location of the incoming water source, and, an onboard back-up heater that thermostatically targets the appropriate temperatures, and a pump that cycles hot water to the application mat and back through the heater.

5. A novel wet heat and hot water application device and method that improves agricultural soil preparation and vegetation management of commercial farms, comprising:

A water impermeable, insulating and flexible liner that conforms to the contour of the land's surface, and has attached to its undersurface a water absorbent mat that possesses a high capillary water holding capacity, and when hot water is distributed throughout said mat, said capillary material saturates, providing hot water or intense wet heat as said mat is slid across surface vegetation and soil as a means of killing plants, soil pathogens and nematodes.

6. A wet heat apparatus as claimed in claim 5, further comprising a pipe configuration with adjustable water emitters embedded throughout said mat as a means of distributing hot water to multiple points of capillary distribution.

7. A wet heat apparatus as claimed in claim 5, further comprising a hot water feed from a heater to said mat and a return "cooled" water line through a storage tank, then back through heater and mat, repeatedly, providing means of reducing the amount of water used in weed kill applications by turning down the flow of said water emitters in said mat and increasing the flow of cycling water and conductive heat exchange between heater and mat.

8. A wet heat apparatus as claimed in claim 5 further comprising: a mobile wheeled unit that supports and suspends said mat in the undercarriage of said unit, and raises the mat for transport and lowers the mat and pulls the mat across live vegetation at a controlled speed (.25 inches per minute to approximately 2 mile per hour) for each specific wet heat application. An electric motor, winch and cable. Said cable threads through a pulley system with adjustable ratio options, where the cable then extends through a front wheel steering terminal and stretches across the area designated for heat treatment. A stake or anchor attached to the cable is inserted into the ground and as the winch retracts against the anchor, pulls said mobile wheeled unit and hot mat.

9. A wet heat apparatus as claimed in claim 8, further comprising, a spool mounted on said mobile unit that provides the means of retrieving or unreeling the incoming hot water hose line as the working mobile unit travels across treatment area.

10. A wet heat apparatus as claimed in claim 7, further comprising: A microwave generator mounted on the top of said wet mat and charging said mat with thermo energy, as a means of reducing water usage while maintaining high wet-heat temperatures.

11. A wet heat apparatus as claimed in claim 7, comprising a small heat pump further removing heat from circulating water and depositing it in said wet mat as a form of supplemental heat.

12. A wet heat apparatus as claimed in claim 8, further comprising a moveable solar hot water preheat system, connected by said hose and spool, with a backup heater onboard said mobile unit, provided with thermostatic controls that enable the backup heater to compensate for discrepancies between solar output and target application temperatures.

13. A method and apparatus to improve the ecological and economic sustainability of farming systems, comprising A flexible mat with high water absorption and capillary water suspension capacity. Said mat is charged with thermo energy by a continuous saturation of hot water (120-209F) A flexible, heat insulated and water impermeable liner covers the top surface and the sides of the thermally charged mat and directs the heat downward. Hot water sops from to the under surface of saturated mat by gravity and capillary flow, onto the plants and into the soil, raising thermo conductivity of the substrate and increasing the amplitude at which the mat discharges its thermo energy. A means of wheeled mobility is provided, with which said mat is pulled along the surface of said plants and soil at concise speeds and locations for specific types of hot water and wet heat applications.

14 . A wet heat apparatus as claimed in claim 13, further providing a means of mobility and guidance, comprising a mobile unit or wagon with wheels and a carriage, an electric motor and winch with a cable that retracts to pull and guide wagon along a designated course. The mobile unit supports and suspends said mat in the undercarriage and raises the mat for transport and lowers the mat and pulls it over live vegetation at a controlled speed (.25 inches per minute to approximately 2 mile per hour) for each specific wet heat or hot water application. Said electric motor or a second electric motor provides mobility and speed control to and from the treatment site, through wheel traction via a chain drive or a differential.

15. A wet heat apparatus as claimed in claim13, further comprising a means of providing said mat with hot water and supplemental heat. An onboard heater, (gas, biodiesel, electric or hydrogen) raises the temperature of incoming water, a low pressure water pump (5-60 psi) circulates hot water through the mat and back through the heater via a small storage tank. Water emitters located along the tubing throughout said mat saturate

the mat with heat and water. Hot water not emitted into said mat releases heat energy through pipe walls into wet mat before returning to heater.

16 . A wet heat apparatus as claimed in claim 15, further comprising a method that reduces the amount of water used in weed soil pest-kill applications by means of turning down the flow of water emitters in said mat and increasing the flow of cycling water and conductive heat exchange between heater and mat.

17. A wet heat apparatus as claimed in claim 13, further comprising, a spool mounted on said mobile unit that provides the means of retrieving or unreeling the incoming hot water hose line as the working mobile unit travels across treatment area.

18. A wet heat Apparatus as claimed in claim13, further comprising an insulated apron attached to the rear section of the said mat as a means of containing treatment heat.

19. A wet heat apparatus as claimed in claim 13, further providing a method for cultivating crops and cover crops, interactively and sustainably, comprising the following steps.

- A. cultivating a cover crop on a prospective field, (legumes, rye grass, weeds, etc.)
- B. spreading compost over cover crop or the weeds of a selected soil bed.
- C. applying hot water (120-209F) with said hot water application technology to soil bed at depth and temperature prescribed for the specific crop and soil treatment.
- D. planting crop and introducing beneficial soil organisms after soil has cooled.
- E. cultivating cover crops and organic matter between treated crop strips
- F. Rotating crops with cover crops

Wherein, the wet heat apparatus improves the effectiveness and efficiency for killing weeds, soil pathogens and nematodes, (i.e. pests) promotes nutrient cycling of cover-crops and organic materials, kills weed seeds, and cultivates healthy soil micro flora, there are several possible variations to the described invention herein that are consistent with the spirit and intent of these claims.